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O*Enothera* and its Segregates.

BY JOHN K. SMALL.

The year 1835 marks a great crisis in the history of the genus *OEnothera* of Linnaeus. Edouard Spach then divided the genus into about a dozen, taking his characters from the flower and fruit. The results of his observations were published in the *Annales des Sciences Naturelles*,\* *Histoire Naturelle des Végétaux*,† and in his *Monographia Onagrearum* published in *Nouvelles Annales du Muséum*,‡ the last named work containing a complete exposition of his conclusions. Although Spach's work was considered good and reliable, his generic lines were not generally accepted, but were used to divide the composite genus *OEnothera* into sections.

Spach, however, was not the first to see that *OEnothera* contained many generic types. In 1763 Adanson published *Onagra*, Rafinesque established *Meriolix* in 1818, in the same year Link separated *Chamissonia* (not *Chamissoa* H.B.K.), and later several genera were proposed by Nuttall.

Between 1835 and the present time authors have at one time or another eliminated one or two genera from *OEnothera*, but it was not until 1893, when Rud. Raimann prepared the *Onagraceae* for Engler and Prantl's *Natürlichen Pflanzenfamilien*,§ that any systematic or logical subdivision of the genus into several genera

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\* (II.) 4: 163-168.

† 4: 347-379.

‡ (III.) 4: 321-407.

§ 3: Abt. 7. 199-223.

appeared. Raimann's conclusions are based on Spach's work, but he has presented them in a much more satisfactory manner than was indicated by the earlier author.

The committee which prepared the List of Pteridophyta and Spermatophyta of Northeastern North America,\* adopted Raimann's interpretation, and it was suggested by Dr. Britton that I make an examination of the material in the Herbarium of Columbia University to ascertain to what extent the characters hitherto assigned for generic lines held. The study has been interesting both from a generic and a specific standpoint in exposing the strong tendency to mass, and to maintain composite species and genera where clear and constant characters exist both in habit and in the more minute morphology.

The following pages contain the results of these observations on the North American species.

I will be glad to receive additional material, either specimens or seeds, for examination. Proposing to present a monograph of this group at an early day.

#### Key to the Genera.

Flowers regular (stamens equal in length.)

Stigma deeply four-cleft, its segments linear.

Ovules and seeds horizontal, inserted in two or rarely in several rows, prismatic-angled. 1. ONAGRA.

Ovules and seeds ascending, not angled.

Buds erect; flowers yellow; ovules and seeds in one row.

2. OENOTHERA.

Buds drooping; flowers pink; ovules and seeds in two rows.

3. ANOGRA.

Stigma entire or rarely four-toothed.

Ovaries and capsules sessile or nearly so, subglobose or elongated.

Calyx-tube longer than the ovary.

Stigma capitate; calyx-tube slender, usually adherent to the style.

10. TARAXIA.

Stigma disk-like; calyx-tube funnellform.

11. GALPINSIA.

Calyx-tube shorter than the ovary.

Stigma disk-like, slightly four-toothed; calyx-tube broadly funnellform, sometimes twice shorter than the ovary.

12. MERIOLIX.

Stigma capitate; calyx-tube campanulate or somewhat funnellform, many times shorter than the ovary.

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\* Mem. Torr. Club, 5.

Capsules incompletely four-celled; calyx-tube with a lobed disk in its throat. 13. EULOBUS.

Capsules with complete septa; calyx-tube naked at the throat. 14. SPHAEROSTIGMA.

Ovaries and capsules long stalked, more or less club-shaped.

15. CHYLISMA.

Flowers irregular (the alternate stamens longer).

Ovules and seeds numerous, not tuberculate, clustered on slender funiculi; capsules club-shaped.

Flowess yellow

4. KNEIFFIA.

Flowers red, purple or white.

5. HARTMANNIA.

Ovules and seeds few, sessile, in one or two rows.

Plants normally acaulescent.

Capsules obtusely or retusely four-angled; seeds with a deep furrow along the raphe.

6. PACHYLOPHUS.

Capsules sharply four-angled; seeds with a tubercle at one end.

7. LAVAUXIA.

Plants caulescent.

Stems diffuse and wiry; leaves 1-2 cm. long; capsules sharply four-angled.

8. GAURELLA.

Stems not diffuse, stout; leaves 4-15 cm. long or longer; capsules broadly winged.

9. MEGAPTERIUM.

# 1. ONAGRA Adans. Fam. Pl. 2: 85. 1763.

Plants annual or biennial.

Flowers small; petals 2-4 mm. broad.

1. *O. cruciata*.

Flowers large; petals one or several centimeters broad.

Calyx-tubes slender, 2.5-5 cm. long.

Stems decumbent; pubescence rather dense, short and appressed.

2. *O. depressa*.

Stems erect or nearly so.

Pubescence villous-hispid, strigose or soft and appressed; species ranging east of the Rocky Mountains.

Capsules 2-2.5 cm. long, abruptly narrowed at the apex

3. *O. biennis*.

Capsules 3-4 cm. long, gradually narrowed from near the base.

4. *O. Oakesiana*.

Pubescence hirsute or canescent-hirsute; species ranging west of the Rocky Mountains.

5. *O. Hookeri*.

Calyx-tubes stout, 6-13 cm. long

Leaves distantly toothed, minutely ciliate.

6. *O. Jamesii*.

Leaves entire, with short bristle-like cilia.

7. *O. macroceles*.

Plants perennial.

8. *O. arguta*.

## 1. ONAGRA CRUCIATA (Nutt).

*Oenothera cruciata* Nutt.; Ser. in DC. Prodr. 3: 47. as synonym. 1828.

*Oenothera biennis* var. *cruciata* T. & G. Fl. N. A. 1: 492. 1840.  
*Onagra biennis cruciata* Britton, Mem. Torr. Club, 5: 233. 1894.  
 Vermont and Massachusetts.

2. ONAGRA DEPRESSA (Greene).

*Oenothera depressa* Greene, Pitt. 2: 216. 1891.  
 Rocky Mountains of Montana.

3. ONAGRA BIENNIS (L.) Scop.

*Oenothera biennis* L. Sp. Pl. 346. 1753.  
*Oenothera muricata* L. Syst. Ed. 12, 263. 1767.  
*Oenothera angustifolia* Mill. Dict. Gard. Ed. 8, no. 2. 1768.  
*Oenothera glabra* Mill. Gard. Dict. Ed. 8, no. 3. 1768.  
*Onagra biennis* Scop. Fl. Carn. Ed. 2, 1: 269. 1772.  
*Oenothera graveolens* Gilib. Fl. Lituan. 2: 168. 1781.  
*Onagra parviflora* Moench, Meth. 675. 1794.  
*Onagra muricata* Moench, Meth. 675. 1794.  
*Oenothera gauroides* Hornem. Hort. Hafn. 1: 362. 1813.  
*Oenothera pubescens* Nees in Neuwied, Reise N. A. 2: 435.  
*Onagra Europaea* Spach, Hist. Veg. 4: 359. 1835.  
*Onagra communis* Spach, Hist. Veg. 4: 359. 1835.  
*Onagra chrysantha* Spach, Hist. Veg. 4: 362. 1835.  
*Onagra vulgaris* Spach, Nouv. Ann. Mus. Par. 4: 353. 1835.  
*Oenothera biennis* var. *vulgaris* T. & G. Fl. N. A. 1: 492. 1840.  
*Oenothera biennis* var. *muricata* T. & G. Fl. N. A. 1: 492. 1840.  
*Oenothera biennis* var. *canescens* T. & G. Fl. N. A. 1: 492. 1840.  
 ? *Oenothera Jepsonii* Greene, Fl. Francis. 211. 1891.

Throughout the United States, east of the Rocky Mountains, ranging from sea-level to about 650 meters on various mountains.

The geographic range of *O. biennis* is not as extensive as has been supposed. The species proper ranges westward only to the Mississippi River. In the area from the Mississippi River to the Rocky Mountains it is represented by a closely related form clothed with strigose pubescence; this form might be separated as a variety or even a species. As far as I can learn, it has not been found west of the Rocky Mountains. Prof. Greene described *Oenothera Jepsonii*\* from California, but later

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\* Fl. Francis. 211.

referred it to *O. biennis*,\* a doubtful disposition unless the plant is introduced. I have not seen specimens of this form.

3a. ONAGRA BIENNIS GRANDIFLORA (Ait.) Lindl.

*Oenothera grandiflora* Ait. Hort. Kew. 2: 2. 1789.

*Oenothera suaveolens* Desf. Tab. 169. 1804.

*Oenothera biennis* var. *grandiflora* Lindl. Bot. Reg. 19. pl. 1604. 1833.

*Oenothera Lamarkiana* Ser. in DC. Prodr. 3: 47. 1828.

Range the same as the species, more common in the Southeast; introduced in the vicinity of San Francisco according to Prof. Greene.

4. ONAGRA OAKESIANA (A. Gray) Britton.

*Oenothera biennis* var. *Oakesiana* A. Gray, Man. Ed. 5, 178. 1867.

*Oenothera Oakesiana* Robbins; A. Gray, Man. Ed. 5, 178. As synonym. 1867.

*Onagra Oakesiana* Britton, Mem. Torr. Club, 5: 233. 1894.

Shores of the St. Lawrence, west to the Great Lake region, south to New York and Nebraska.

5. ONAGRA HOOKERI (T. & G.).

*Oenothera Hookeri* T. & G. Fl. N. A. 1: 493. 1840.

*Oenothera biennis* Torr. Emory Rep. 140. 1848. Not L.

? *Oenothera odorata* H. & A. Bot. Beech. Voy. 343. 1841.

*Oenothera biennis* var. *hirsutissima* A. Gray, Pl. Fendl. 43. 1848.

Western slopes of the Rocky Mountains, west to the Pacific; at 1800 meters in Utah.

It seems remarkable that this excellent species could be confounded with *O. biennis*. Its gross characters are so strong that a scrap or even a leaf is sufficient to separate it from related species. It does not range east of the Rocky Mountains and is the western homologue of the eastern *O. biennis*.

6. ONAGRA JAMESII (T. & G.).

*Oenothera Jamesii* T. & G. Fl. N. A. 1: 493. 1840.

Southern Utah south to eastern Texas and eastern Arizona.

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\* Man. Bot. Bay Reg. 131.

## 7. ONAGRA MACROSCELES (A. Gray).

*OEnothera macrosceles* A. Gray, Pl. Fendl. 43. 1848.

Northern Mexico.

## 8. ONAGRA ARGUTA (Greene).

*OEnothera arguta* Greene, Fl. Francis, 212. 1891.

Southern California, from Monterey southward. I have not seen specimens of this plant.

## 2. OENOTHERA L. Sp. Pl. 340. 1753.

Flowers axillary.

Plants clothed with dense appressed or ascending pubescence.

Flowers 2-3 cm. broad; species of the Atlantic Coast. 1. *O. humifusa*

Flowers 7-9 cm. broad; species of the Western Gulf

Coast.

2. *O. Drummondii*.

Plants glabrous or rarely clothed with spreading hairs.

3. *O. laciniata*.

Flowers in terminal leafy bracted spikes.

Spike few-flowered, loose; bracts ovate; calyx villous.

4. *O. heterophylla*.

Spike many-flowered, dense; bracts narrow; calyx silky.

5. *O. rhombipetala*.

## 1. OENOTHERA HUMIFUSA Nutt.

*OEnothera humifusa* Nutt. Gen. 1: 245. 1818.*OEnothera sinuata* var. *humifusa* T. & G. Fl. N. A. 1: 494. 1840.

Drifting sand along the coast from New Jersey to Florida; ranges but little above sea-level.

## 2. OENOTHERA DRUMMONDII Hook.

*OEnothera Drummondii* Hook. Bot. Mag. pl. 3361. 1835.? *OEnothera sinuata* var. *humifusa* A. Gray, Proc. Am. Acad. 5: 158. 1862.

Coast of Texas; ranges only a few meters above sea-level.

## 3. OENOTHERA LACINIATA Hill.

*OEnothera laciniata* Hill, Syst. Veg. 12: 64. 1767.*OEnothera sinuata* L. Mant. 2: 228. 1771.*OEnothera repanda* Medic. Act. Acad. Theod. Palat. 3: 198. pl. 8. 1775.*Onagra sinuata* Moench, Meth. 676. 1794.*OEnothera prostrata* Ruiz & Pavon, Fl. Per. 3: 79. pl. 315. 1802.*OEnothera minima* Pursh, Fl. Am. Sept. 262. pl. 15. 1814.

*Oenothera sinuata* var. *minima* Nutt. Gen. 1: 245. 1818.

? *Oenothera longiflora* Scheele; S. Wats. Proc. Am. Acad. 8: 618  
1873. Not Jacq.

New Jersey south to Florida, to Texas and Nebraska, also in  
central and northern South America.

3a. OENOTHERA LACINIATA MEXICANA (Spach).

*Oenothera Mexicana* Spach, Nouv. Ann. Mus. Par. 4: 347. 1835.

*Oenothera sinuata* var. *hirsuta* T. & G. Fl. N. A. 1: 494. 1840.  
Nebraska to Texas and Mexico.

3b. OENOTHERA LACINIATA OCCIDENTALIS.

*Oenothera sinuata* var. *grandiflora* S. Wats. Proc. Am. Acad. 8:  
581. 1873. Not *OE. grandiflora* Ait. 1789.

? *Oenothera longiflora* Scheele; S. Wats. Proc. Am. Acad.  
8: 618. 1873.

Missouri to Kansas, south to Texas.

4. OENOTHERA HETEROPHYLLA Spach.

*Oenothera heterophylla* Spach, Nouv. Ann. Mus. Par. 4: 348.  
1835.

*Oenothera bifrons* Don, Sweet, Brit. Fl. Gard. (II.) pl. 386.  
1831-1838.

*Oenothera rhombipetala* Engelm. & Gray, Bost. Journ. Nat. Hist  
5: 216. 1847.

*Oenothera Leona* Buckley, Proc. Acad. Phila. 1861: 163. 1861.  
Florida to Texas.

5. OENOTHERA RHOMBIPETALA Nutt.

*Oenothera rhombipetala* Nutt.; T. & G. Fl. N. A. 1: 493. 1840.

*Oenothera Darlingtonii* Pickering; S. Wats. Proc. Am. Acad. 8:  
612. 1873.

Minnesota and Wisconsin, to Illinois, Nebraska and Indian Ter-  
ritory.

4. ANOGRAS Spach, Ann. Sci. Nat. (II.) 4: 164. 1835.

*Burmanna* Spach, Hist. Veg. 4: 351. 1835. Not DC. 1833.

Tips of the calyx-segments not free in the bud.

Capsules divergent or reflexed.

Valves of the capsules not winged at the base.

Valves of the capsules winged at the base.

1. *A. deltoidea*.

2. *A. xylocarpa*.



- Capsules more or less ascending.  
 Seeds narrow, smooth, sharply pointed. 3. *A. trichocalyx*.  
 Seeds ovoid, minutely ribbed and pitted, rather blunt. 4. *A. albicaulis*.  
 Tips of the calyx-segments free in the bud.  
 Throat of the calyx-tube villous within. 5. *A. coronopifolia*.  
 Throat of the calyx-tube glabrous within.  
 Calyx glabrous or rarely appressed pubescent.  
 Stem several centimeters long; leaves long-petioled. 6. *A. simplex*.  
 Stem elongated; leaves short-petioled or sessile. 7. *A. pallida*.  
 Calyx villous.  
 Lower leaves oblanceolate or spatulate in outline. 8. *A. Californica*.  
 Lower leaves lanceolate or oblong in outline. 9. *A. Neo-Mexicana*.

#### 1. ANOGRA DELTOIDEA (Torr & Frem.).

*Oenothera deltoidea* Torr. & Frem., Frem. Rep. 315. 1845.  
 Utah to California and Arizona.

#### 2. ANOGRA XYLOCARPA (Coville).

*Oenothera xylocarpa* Coville, Cont. Nat. Herb. 4: 105. 1892.  
 Tulare County, California.

#### 3. ANOGRA TRICHOCALYX (Nutt.).

*Oenothera trichocalyx* Nutt.; T. & G. Fl. N. A. 1: 494. 1840.  
 Wyoming to California and New Mexico; ascends to 1950 meters in California.

#### 4. ANOGRA ALBICAULIS (Pursh) Britton.

*Oenothera albicaulis* Pursh, Fl. Am. Sept. 733. 1814.  
*Oenothera pinnatifida* Nutt. Gen. 1: 245. 1818.  
*Oenothera Purshiana* Steud. Nom. 2: 207. 1841.  
*Oenothera Purshii* Don, Gard. Dict. 2: 688. 1832.  
*Burmannia pinnatifida* Spach, Hist. Veg. 4: 353. 1835.  
*Anogra pinnatifida* Spach, Nouv. Ann. Mus. Par. 4: 341. 1835.  
*Oenothera coronopifolia* A. Gray, Pl. Wright. 2: 56. 1853.  
*Anogra albicaulis* Britton, Mem. Torr. Club, 5: 234. 1894.  
 South Dakota to the Rocky Mountains south to Indian Territory, New Mexico and Sonora, ascending to 1100 meters in the Black Hills.

#### 5. ANOGRA CORONIPOFOLIA (T. & G.) Britton.

*Oenothera coronipofolia* T. & G. Fl. N. A. 1: 245. 1840.

*Oenothera pinnatifida* James, Bot. Long's Exp. 2: 154. 1825.  
Not Nutt. 1818.

South Dakota to Wyoming, south to Kansas, Utah and New Mexico.

6. ANOGR SIMPLEX.

*Oenothera ambigua* S. Wats. Proc. Am. Acad. 14: 293. 1879.  
Not Spreng, 1825.

*Oenothera albicaulis* var. *decumbens* S. Wats. Proc. Am. Acad. 14: 293. 1879, as synonym. Not *OE. decumbens* Dougl.  
Southern Utah and Northern Arizona.

7. ANOGRA PALLIDA (Lindl.) Britton.

*Oenothera albicaulis* Nutt. Fras. Cat. Name only. 1813.

*Oenothera pallida* Lindl. Bot. Reg. 14: pl. 1142. 1828.

*Oenothera Nuttallii* Sweet, Hort. Brit. Ed. 2, 199. 1830.

*Baumannia Nuttalliana* Spach, Hist. Veg. 4: 352. 1835.

*Anogra Nuttalliana* Spach, Nouv. Ann. Mus. Par. 4: 339, 1835.

*Baumannia Douglasiana* Spach, Hist. Veg. 4: 352. 1835.

*Anogra Douglasiana* Spach, Nouv. Ann. Mus. Par. 4: 339, 1835.

*Oenothera pinnatifida* var. *integrifolia* A. Gray, Pl. Fendl. 44. 1848.

*Oenothera albicaulis* var. *Nuttallii* Engelm. Am. Journ. Sci. (II.) 34: 334. 1862.

*Oenothera leptophylla* Nutt.; S. Wats. Proc. Am. Acad. 8: 602. 1873.

British Columbia to Washington and Minnesota south to Sonora; ascends to about 1700 meters in the Black Hills.

7a. ANOGR PALLIDA LATIFOLIA (Rydberg).

*Oenothera pallida* var. *latifolia* Rydberg, Cont. Nat. Herb. 3: 159. 1895.

Nebraska and Colorado.

7b. ANOGR PALLIDA RUNCINATA (Engelm.).

*Oenothera albicaulis* var. *runcinata* Engelm. Am. Journ. Sci. (II.), 34: 334. 1862.

*Oenothera pinnatifida* A. Gray, Pl. Fendl. 43. In part. 1848.  
Not Nutt. 1818.

Utah to Arizona and Texas.

7c. *ANOGRA PALLIDA BREVIFOLIA* (Engelm.).

*Oenothera albicaulis* var. *brevifolia* Engelm. Am. Journ. Sci. (II.)

34: 335. 1862.

Sand hills south of El Paso, Texas.

7d. *ANOGRA PALLIDA ENGELMANNI*.

*Oenothera albicaulis* var. *trichocalyx* Engelm. Am. Journ. Sci.

(II.), 34: 335. 1862. Not *O. trichocalyx*. Nutt. 1840.

Las Vegas, New Mexico.

8. *ANOGRA CALIFORNICA* (S. Wats.).

*Oenothera albicaulis* var. *Californica* S. Wats. Proc. Am. Acad.

8: 582. 1873.

*Oenothera Californica* S. Wats. Bot. Calif. 1: 223. 1876.

Central California to southern Utah and southward; ascends to 1900 meters in the San Bernardino Mountains.

9. *ANOGRA NEO-MEXICANA* n. sp.

*Oenothera albicaulis* var. *A.* Gray, Pl. Wright. 2: 56. 1853.

Annual or perennial, stout, hispid-villous, dark green. Stem erect, 6–7 dm. tall, flexuous, somewhat branched, clothed with a pale papery bark; leaves oblong or lanceolate, 4–8 cm. long, obtuse or acute, sinuate-toothed or somewhat pinnatifid, puberulent, with some hispid-villous hairs on the mid-rib and lateral nerves, rather abruptly narrowed into a slender petiole which is less than one centimeter long; flowers few at the ends of the branches, 5–6 cm. broad; calyx hispid-villous, its tube stoutish, 4–4.5 cm. long; nearly thrice longer than the ovary, its segments nearly linear, one-half as long as the tube, the tips free in the bud; petals broadly obdeltoid, 1.8 cm. long, 2 cm. broad, somewhat emarginate, narrowed into a broad claw; filaments about one-half as long as the petals; anthers 1–1.2 cm. long; style slender, longer than the petals; capsule nearly cylindric, 2–2.5 cm. long, somewhat narrowed at the base and the apex, hispid-villous; seeds “oblong and perfectly smooth.”

New Mexico. Wright, no. 1068.

A perfectly distinct species, related to *A. pallida*, but easily separated by its foliage and hispid-villous calyx.

4. *KNEIFFIA* Spach, Hist. Veg. 4: 373. 1835.

Stem-leaves linear-filiform; capsule 4-angled or slightly winged. 1. *K. linifolia*.

Stem-leaves never approaching filiform; capsules winged.

Capsules more or less club-shaped.

Capsules pubescent.

Stems decumbent, spreading; pedicels shorter than the body of the capsules. 2. *K. Alleni*.

Stems erect or nearly so, not spreading.

Pedicels longer than the body of the capsules.

Body of the capsules subglobose; leaves numerous. 3. *K. subglobosa*.

Body of the capsules obovoid, leaves few. 4. *K. longipedicellata*.

Pedicels shorter than the body of the capsules.

Capsules on slender pedicels, with thin wings. 5. *K. linearis*.

Capsules on stout pedicels (sometimes nearly sessile) with thick wings. 6. *K. Spachiana*.

Capsules glabrous or glabrate. 7. *K. pumila*.

Capsules oblong or nearly so.

Plants not glaucous; capsules less than 1 cm. long. 8. *K. fruticosa*.

Plants somewhat glaucous; capsules 1 cm. long. 9. *K. glauca*.

### 1. KNEIFFIA LINIFOLIA (Nutt.) Spach.

*Oenothera linifolia* Nutt. Journ. Acad. Phila. 2: 120. 1821.

*Kneiffia linifolia* Spach, Nouv. Ann. Mus. Par. 4: 368. 1835.

Kansas and Illinois to Texas and Georgia; ascends only a few meters above sea-level.

### 2. KNEIFFIA ALLENI (Britton).

*Oenothera fruticosa* var. *humifusa* Allen, Bull. Torr. Club, 1: 3. 1870. Not *OE. humifusa* Nutt. 1818.

*Kneiffia linearis* *Aleni* Britton, Mem. Torr. Club, 5: 235. 1894.

Eastern end of Long Island, at sea-level.

This local form must be separated from the species with which it has been associated on account of its habit, flowers and capsule.

### 3. KNEIFFIA SUBGLOBOSA n. sp.

Perennial, slender, puberulent, dull green, producing numerous stolons. Stem erect, 2–3 dm. tall, much branched, strict or slightly flexuous, red; basal leaves spatulate, 4–10 cm. long, obtuse or acutish, undulately toothed, gradually narrowed into a short petiole; stem leaves linear or nearly so, 2–7 cm. long, entire or distantly toothed, narrowed into a short petiole or sessile, slightly revolute; flowers in terminal racemes which are more or less corymbosely arranged, yellow, about 3 cm. broad; calyx villous or silky, its tube slender, 1 cm. long, about twice as long as the ovary, its segments linear, about as long as the tube and less pubescent, the tips free in the bud; petals obovate, 1.5 cm long, notched at the apex; filaments nearly one half as long as the petals;

style slender, two-thirds as long as the petals; stigmas filiform, 3–4 mm. long; capsule at length subglobose, or globose-obovoid, 6–7 mm. long, on a stalk which exceeds the body, the angles strongly winged, the faces strongly ridged; seeds very irregular, minutely papillose, black, 1 mm. long.

North Carolina and Georgia.

Most closely related to *K. Alleni* and part of Torrey and Gray's var.  $\beta$ . It differs especially in its erect habit, very different basal leaves and larger flowers.

#### 4. *KNEIFFIA LONGIPEDICELLATA* n. sp.

Annual, slender, bright green, more or less puberulent, stem erect or assurgent, 4–7 dm. tall, red, slender, simple or sparingly branched above; basal-leaves spatulate or obovate-spatulate, 4–6 cm. long; stem-leaves few, linear-lanceolate, 3–9 cm. long, obtuse or acutish, entire, often somewhat undulate, narrowed into a short petiole; flowers yellow, subtended by leaf-like bracts in terminal racemes which are sometimes corymbosely arranged; calyx hirsute, its tube slender, 1–1.5 cm. long, its segments linear, longer than the tube, the tips free in the bud; petals obovate, 2 cm. long, many-nerved, emarginate, stamens less than one half as long as the petals; styles slender, two-thirds as long as the petals; capsule narrowly obovoid, 1 cm. long, its angles winged, its faces ridged, on pedicels longer than the body; seeds irregularly oblong, .8 mm. long, brown, minutely papillose.

West Virginia to North Carolina and Florida.

Between *K. subglobosa* and *K. linearis*. It differs from the former in its sparsely leafy, usually nearly simple stem, the hirsute calyx, the larger flowers and the narrowly obovoid capsules. It can easily be separated from *K. linearis* by its pedicel, which exceeds the body of the capsule.

#### 5. *KNEIFFIA LINEARIS* (Michx.) Spach.

*Oenothera linearis* Michx. Fl. Bor. Am. 1: 225. 1803.

?*Oenothera media* Link, Enum. Hort. Berol. 1: 377. 1821. acc. to S. Wats.

*Oenothera riparia* Nutt. Gen. 1: 247. 1818.

?*Oenagra Linkiana* Spach, Nouv. Ann. Mus. Par. 4: 354. 1835.

*Oenothera fruticosa* var. *linearifolia* Hook. Bot. Mag. pl. 3545. 1837.

*Kneiffia linearis* Spach, Hist. Veg. 4: 376. 1835.

*Kneiffia angustifolia* Spach, Nouv. Ann. Mus. Par. 4: 368. 1835.

?*Kneiffia maculata* Spach, Hist. Veg. 4: 375. 1835.

*Oenothera fruticosa* var. *linearis* S. Wats. Proc. Am. Acad. 8: 584. 1873.

Connecticut to Tennessee, south to Georgia.

#### 6. KNEIFFIA SPACHIANA (T. & G.).

*Oenothera Spachiana* T. & G. Fl. N. A. 1: 498. 1840.

*Blennoderma Drummondii* Spach, Nouv. Ann. Mus. Par. 4: 408. 1835.

*Oenothera Drummondii* Walp. Rep. 2: 85. 1843. Not Hook.

*Oenothera uncinata* Scheele, Linnaea, 21: 578. 1848.

Texas and Louisiana; ascends only a few feet above sea-level.

#### 7. KNEIFFIA PUMILA (L.) Spach.

*Oenothera pumila* L. Sp. Pl. Ed. 2, 493. 1762.

*Oenothera pusilla* Michx. Fl. Bor. Am. 1: 225. 1803.

*Oenothera chrysantha* Michx. Fl. Bor. Am. 1: 225. 1803.

*Oenothera gracilis* Schrad.; F. & M. Ind. Sem. Hort. Petrop. 2:

44. 1835.

*Oenothera riparia* Lehm.; Hook. Fl. Bor. Am. 1: 212. 1830, not Nutt.

*Kneiffia pumila* Spach, Hist. Veg. 4: 377. 1835.

*Kneiffia chrysantha* Spach, Hist. Veg. 4: 377. 1835.

Nova Scotia to the Saskatchewan south to Georgia.

#### 8. KNEIFFIA FRUTICOSA (L.) Raimann.

*Oenothera fruticosa* L. Sp. Pl. 346. 1753.

*Oenothera mollissima* Walt. Fl. Car. 129. 1788.

*Oenothera hybrida* Michx. Fl. Bor. Am. 1: 225. 1803.

*Oenothera tetragona* Roth, Cat. Bot. 2: 39. 1825.

*Oenothera Canadensis* Goldie, Edinb. Phil. Journ. 6: 325. 1822.

*Oenothera incana* Nutt. Gen. 1: 247. 1818.

*Oenothera serotina* Don; Sweet, Brit. Fl. Gard. 2: pl. 184 1825–1827.

*Kneiffia suffruticosa* Spach, Nouv. Ann. Mus. Par. 4: 365. 1835.

*Oenothera fruticosa* var. *differta* Millsp. Fl. W. Va. 366. 1892.

*Kneiffia fruticosa* Raimann, in Engl. & Prantl. Nat. Pfl. Fam. 3: Abt. 7, 214. 1893.

Nova Scotia to Missouri and southward.

## 8a. KNEIFFIA FRUTICOSA PILOSELLA (Raf.) Britton.

*Oenothera Pilosella* Raf. Ann. Nat. 15. 1820.

? *Oenothera fruticosa* var. *ambigua* Nutt. Gen. 1: 247. 1818.

? *Oenothera ambigua* Spreng. Syst. 2: 229. 1825.

*Kneiffia floribunda* Spach, Nouv. Ann. Mus. Par. 4: 366. 1835.

*Oenothera fruticosa* var. *hirsuta* Nutt.; T. & G. Fl. N. A. 1: 496. 1840.

*Kneiffia fruticosa Pilosella* Britton, Mem. Torr. Club, 5: 234. 1894.

## 9. KNEIFFIA GLAUCA (Michx.) Spach.

*Oenothera glauca* Michx. Fl. Bor. Am. 1: 224. 1803.

*Kneiffia glauca* Spach, Hist. Veg. 4: 374. 1835

*Oenothara Fraseri* Pursh, Fl. Am. Sept. 734. 1814.

*Oenothera glauca* var. *Fraseri* T. & G. Fl. N. A. 1: 497. 1840.

*Oenothera fruticosa* var. *Fraseri* Hook. Bot. Mag. pl. 3548. 1837.

*Kneiffia Fraseri* Spach, Hist. Veg. 4: 375. 1835.

Virginia and Kentucky, south to Georgia and Alabama, ascends to 1600 meters on Roan. Mt., Tenn.

## 5. HARTMANNIA Spach, Hist. Veg. 4: 370. 1835.

[XYLOPLEURUM Spach, Hist. Veg. 4: 378. 1835.]

Plants canescent (except some forms of *H. rosea parviflora*).

Calyx-tube shorter than the ovary; capsule club-shaped.

1. *H. rosea*.

Calyx-tube longer than the ovary; capsule oblong or elliptic.

2. *H. speciosa*.

Plants more or less villous.

3. *H. tetraptera*.

## 1. HARTMANNIA ROSEA (Ait.) Don.

*Oenothera rosea* Ait. Hort. Kew. 2: 3. 1789.

*Oenothera rubra* Cav. Ic. 4: 68. pl. 400. 1797.

*Oenothera purpurea* Lam. Encycl. 4: 554. 1797.

*Hartmannia rosea* Don, in Sweet, Hort. Brit. Ed. 3, 236. 1. 839.

*Hartmannia gauroides* Spach, Hist. Veg. 4: 371. 1835.

*Xylopleurum roseum* Raimann, in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 214. 1893.

Texas to New Mexico and southward; also in western South America.

## 1a. HARTMANNIA ROSEA PARVIFOLIA (Coul.).

*Oenothera rosea* var. *parvifolia* Coul. Cont. Nat. Herb. 2: 186.  
1891.

Texas and northern Mexico.

## 2. HARTMANNIA SPECIOSA (Nutt.).

*Oenothera speciosa* Nutt. Journ. Acad. Phila. 2: 119. 1821.

*Xylopleurum hirsutum* Spach, Nouv. Ann. Mus. Par. 4: 370.  
1835.

*Xylopleurum Nuttallii* Spach, Nouv. Ann. Mus. Par. 4: 371.  
1835.

*Xylopleurum Drummondii* Spach, Nouv. Ann. Mus. Par. 4: 371.  
1835.

*Xylopleurum obtusifolium* Spach, Nouv. Ann. Mus. Par. 4: 372.  
1835.

*Oenothera Spachii* Dietr. Syn. 2: 1289. 1840.

*Oenothera obtusifolia* Dietr. Syn. 2: 1289. 1840.

*Oenothera Drummondii* Schnitzlein, Ic. pl. 265. f. 1.

*Xylopleurum speciosum* Raimann, in Eng. & Prantl, Nat. Pfl.  
Fam. 3: Abt. 7, 214. 1893.

Missouri to Kansas, south to Texas and Mexico; introduced  
into fields around Charleston, S. C.

## 3. HARTMANNIA TETRAPTERA (Cav.).

*Oenothera tetraptera* Cav. Ic. 3: 40. pl. 279. 1794.

Texas, Mexico, Central America and northern South America.

## 6. PACHYLOPHUS Spach, Hist. Veg. 4: 365. 1835.

PACHYLOPHUS CAESPITOSA (Nutt.) Raimann.

*Oenothera caespitosa* Nutt. Fras. Cat. 1813.

*Oenothera scapigera* Pursh, Fl. Am. Sept. 263. 1814.

*Pachylophus Nuttallii* Spach, Hist. Veg. 4: 365. 1835.

*Pachylophus Nuttalliana* Spach, Nouv. Ann. Mus. Par. 4: 356.  
1835.

*Oenothera montana* Nutt.; T. & G. Fl. N. A. 1: 500. 1840.

*Oenothera marginata* Nutt.; Hook. & Arn. Bot. Beech. 342.  
1841.

*Oenothera eximia* A. Gray, Pl. Fendl. 45. 1848.



*Pachylophis caespitosa* Raimann, in Eng. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 215. 1893.

Dakota to Idaho, south to California, New Mexico and Senora.

7. LAVAUXIA Spach, Hist. Veg. 4: 366. 1835.

Tips of the calyx-segments not free in the bud.

1. *L. primiveris*.

Tips of the calyx-segments free in the bud.

Leaves thinnish, very conspicuously pinnatifid.

2. *L. triloba*.

Leaves thick, entire or sparingly pinnatifid near the base.

Capsule ovoid or elliptic; testa of the seed thickened.

3. *L. brachycarpa*.

Capsule attenuate at the apex; testa of the seed not thickened.

4. *L. Wrightii*.

1. LAVAUXIA PRIMIVERIS (A. Gray).

*Oenothera primiveris* A. Gray, Pl. Wright. 2: 58. 1853.

Texas and New Mexico.

2. LAVAUXIA TRILOBA (Nutt.) Spach.

*Oenothera triloba* Nutt. Journ. Acad. Phila. 2: 118. 1821.

*Oenothera rhizocarpa* Spreng. Syst. 2: 239. 1825.

*Lavauxia triloba* Spach, Hist. Veg. 4: 367. 1835.

*Lavauxia Nuttalliana* Spach, Nouv. Ann. Mus. Par. 4: 358. 1835.

*Oenothera Roemeriana* Scheele, Linnaea, 22: 154. 1849.

*Oenothera clandestina* Nutt.; S. Wats. Proc. Am. Acad. 8: 615. 1873.

Saskatchewan to Texas, California and Sonora.

2a. LAVAUXIA TRILOBA WATSONI Britton.

*Oenothera triloba* (?) var. *parviflora* S. Wats. Proc. Am. Acad. 12: 251. 1876. Not *O. parviflora* L.

*Lavauxia triloba Watsoni* Britton, Mem. Torr. Club, 5: 235. 1894.

Kansas and Nebraska.

3. LAVAUXIA BRACHYCARPA (A. Gray) Britton.

*Oenothera brachycarpa* A. Gray, Pl. Wright. 1: 70. 1852.

*Oenothera marginata* var. *purpurea* S. Wats. Bot. King's Rep. 5: 108. 1871.

*Lavauxia brachycarpa* Britton, Mem. Torr. Club, 5: 235. 1894.

Western Texas and New Mexico, probably in Nevada and Montana.

4. LAVAUXIA WRIGHTII (A. Gray).

*Oenothera Wrightii* A. Gray, Pl. Wright. 2: 57. 1853.  
New Mexico.

8. GAURELLA.

Perennial herbs low, wiry, diffuse, canescent or strigilose. Stems at length branched throughout and spreading, leafy, clothed with a longitudinally wrinkled bark; leaves small, linear-lanceolate or lanceolate, nearly entire or distantly toothed, narrowed into a very short petiole; flowers axillary, white or rose-colored, spotted or striped with red; calyx purplish, its tube cylindric, slightly dilated at the throat, twice as long as the ovary, its segments slightly longer than the tube; their tips not free in the bud; petals obovate, truncate or emarginate; filaments filiform-subulate; anthers linear; ovary sessile, 4-angled; style stoutish, enlarged at the top; stigmas filiform; capsule ovoid-pyramidal, sessile, attenuate into a slender curved beak, the angles keeled, the faces swollen; seeds obovoid, angled, pointed at the base; delicately striate.

A perfectly distinct genus, with no very close affinity to related groups. It differs from *Megapterium*, with which it has been associated, in habit, foliage, inflorescence and fruit.

1. GAURELLA GUTTULATA (Geyer).

*Oenothera canescens* Torr. & Frem., Frem. Rep. 315. 1845.  
Not *OE. biennis* var. *canescens* T. & G. 1840.

*Oenothera guttulata* Geyer; Hook. Lond. Journ. Bot. 6: 222. 1847.

*Megapterium canescens* Britton, Mem. Torr. Club, 5: 235. 1894.  
Wyoming to Kansas and New Mexico.

9. MEGAPTERIUM Spach, Hist. Veg. 4: 363. 1835.

Leaves entire or nearly so.

Capsule (with wings) oblong, 2-3 cm. long.

1. *M. Fremontii*.

Capsule (with wings) suborbicular, 5-6 cm. long.

2. *M. Missouriense*.

Leaves pinnatifid.

3. *M. dissectum*.

1. MEGAPTERIUM FREMONTII (S. Wats.) Britton.

*Oenothera Fremontii* S. Wats. Proc. Am. Acad. 8: 587. 1873.

*Megapterium Fremontii* Britton, Mem. Torr. Club, 5: 286. 1893.

Kansas to Texas.

## 2. MEGAPTERIUM MISSOURIENSE (Sims) Spach.

*Oenothera Missouriensis* Sims, Bot. Mag. *pl.* 1592. 1814.

*Oenothera macroparpa* Pursh, Fl. Am. Sept. 374. 1814.

*Oenothera alata* Nutt. Gen. 1: 248. 1818.

*Megapterium Missouriense* Spach, Hist. Veg. 4: 364. 1835.

*Megapterium Nuttallianum* Spach, Hist. Veg. 4: 363. 1835.

*Oenothera Drummondii* Hook. Lond. Journ. Bot. 6: 221. 1847.

*Oenothera Missouriensis* var. *latifolia* A. Gray, Bost. Journ. Nat. Hist. 5: 188. 1856.

*Oenothera Missouriensis* var. *incana* A. Gray, Bost. Journ. Nat. Hist. 5: 189. 1856.

Nebraska to Texas.

## 3. MEGAPTERIUM DISSECTUM (A. Gray).

*Oenothera dissecta* A. Gray, Proc. Am. Acad. 17: 356. 1882.

*Oenothera Havardi* S. Wats. Proc. Am. Acad. 20: 366. 1885.

Western Texas and northern Mexico.

## 10. TARAXIA Nutt.; Raimann in Engl. and Prantl, Nat. Pfl. Fam. 3: Abt. 7, 216. 1893.

Leaves not pinnatifid.

Plants hirsute.

Plants acaulescent.

1. *T. graciliflora*.

Plants producing several short branches.

2. *T. Palmeri*.

Plants glabrous or glabrate; leaves lanceolate or linear.

Leaves lanceolate; calyx-segments linear-lanceolate.

3. *T. heteranthera*.

Leaves ovate; calyx-segments lanceolate.

4. *T. ovata*.

Leaves pinnatifid.

Sparingly pubescent; calyx-tube longer than the segments; seeds minutely pitted in rows.

5. *T. breviflora*.

Densely pubescent; calyx-tube several times longer than the segments; seeds conspicuously pitted.

6. *T. longiflora*.

## 1. TARAXIA GRACILIFLORA (H. &amp; A.) Raimann.

*Oenothera graciliflora* H. & A. Bot. Beech. Voy. 341. 1841.

*Taraxia graciliflora* Raimann, in Engl. & Prantl, Nat. Pfl. Fam. 3: abt. 7, 217. 1893.

California except the extreme north; apparently also in Colorado.

## 2. TARAXIA PALMERI (S. Wats.).

*Oenothera Palmeri* S. Wats. Proc. Am. Acad. 12: 251. 1877.  
Valleys, Arizona and southern California.

## 3. TARAXIA HETERANTHA (Nutt.).

*Oenothera heterantha* Nutt. Journ. Acad. Phila. 7: 22. 1834.

*Jussiaea subacaulis* Pursh, Fl. Am. Sept. 304. 1814.

*Oenothera triloba* Hook. Lond. Journ. Bot. 6: 223. 1847.  
Not Nutt. 1821.

Idaho and Oregon to Utah and Nevada; at about 2200 meters  
in Utah.

## 3a. TARAXIA HETERANTHA TARAXACIFOLIA (S. Wats.).

*Oenothera heterantha* var. *taraxacifolia* S. Wats. Proc. Am.  
Acad. 8: 589. 1873.

On the Sierra Nevada.

## 4. TARAXIA OVATA (Nutt.).

*Oenothera ovata* Nutt.; T. & G. Fl. N. A. 1: 507. 1840.

California from San Francisco to Monterey.

## 5. TARAXIA BREVIFLORA (T. &amp; G.) Nutt.

*Oenothera breviflora* T. & G. Fl. N. A. 1: 506. 1840.

*Oenothera Nuttallii* Torr. & Frem., Frem. Rep. 89. 1845.

*Taraxia breviflora* Nutt.; T. & G. Fl. N. A. 1: 506. 1840.

Northwest Territory to Colorado and Utah, where it ascends  
to about 2800 meters.

## 6. TARAXIA LONGIFLORA Nutt.

*Oenothera Nuttallii* T. & G. Fl. N. A. 1: 506. 1840. Not  
Sweet. 1830.

*Oenothera tanacetifolia* T. & G. Pacif. R. R. Rep. 2: 121. *pl.* 4,  
1854.

*Taraxia longiflora* Nutt.; T. & G. Fl. N. A. 1: 506. As syno-  
nym. 1840.

Washington to Nevada and California.

## 11. GALPINSIA Britton, Mem. Torr. Club, 5: 263. 1894.

[SALPINGIA Raimann in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7,  
217. 1893. Not *Salpinga* DC.]

Free tips of the calyx-segments about 3 mm. long.

1. *G. Hartwegii*.

Free tips of the calyx-segments less than 2 mm. long.

Plants hispid; calyx-tube much longer than the ovary.

2. *G. Greggii*.

Plants puberulent; calyx-tube slightly longer than the ovary.

3. *G. tubicula*.

## 1. GALPINSIA HARTWEGI (Benth.) Britton.

*Oenothera Hartwegi* Benth. Pl. Hartw. 5. 1839.

*Oenothera lavandulaefolia* T & G. Fl. N. A. 1: 501. 1840.

*Oenothera Hartwegi* var. *lavandulaefolia* S. Wats. Proc. Am. Acad. 8: 590. 1873.

*Salpingia Hartwegi* Raimann, in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 217. 1893.

*Galpinsia Hartwegi* Britton, Mem. Torr. Club, 5: 236. 1894.  
Kansas to Colorado and Mexico.

## 1a. GALPINSIA HARTWEGI FENDLERI (A. Gray).

*Oenothera Fendleri* A. Gray, Pl. Fendl. 45. 1848.

*Oenothera Hartwegi* var. *Fendleri* A. Gray, Pl. Wright. 2: 56. 1853.

Nebraska to Indian Territory, Texas and New Mexico.

## 2. GALPINSIA GREGGII (A. Gray).

*Oenothera Greggii* A. Gray, Pl. Fendl. 46. 1848.

*Oenothera Lampsana* Buckl. Proc. Acad. Phila. 1861: 454. 1861.

*Oenothera Hartwegi* var. A. Gray, Proc. Acad. Phila. 1862: 163. 1862.

New Mexico and northern Mexico.

## 3. GALPINSIA TUBICULA (A. Gray).

*Oenothera tubicula* A. Gray, Pl. Wright. 1: 71. 1852.

*Oenothera tubicula* var. *demissa* A. Gray, Pl. Wright. 1: 71, 1852.

Northwestern Texas and New Mexico.

## 12. MERIOLIX Raf. Am. Month. Mag. 4: 192. 1881.

[*CALYLOPHIS* Spach, Hist. Veg. 4: 350. 1835.]

## 1. MERIOLIX SERRULATA (Nutt.) Walp.

*Oenothera serrulata* Nutt. Gen. 1: 246. 1818.

*Calylophus Nuttallii* Spach, Hist. Veg. 4: 350, 1835.

*Oenothera fruticosa* A. Gray, Pl. Fendl. 44. 1848.

*Oenothera leucocarpa* Comien; Lehm. in Hook. Fl. Bor. Am. 1: 210. 1833.

*Oenothera serrulata* var. *Douglassi* T. & G. Fl. Bor. Am. 1: 502. 1840.

*Oenothera serrulata* var. *Drummondii* T. & G. Fl. N. A. 1: 502. 1840.

*Calylophis Drummondiana* Spach, Nouv. Ann. Mus. Par. 4: 337. 1835.

? *Calylophis Berlandieri* Spach, Nouv. Ann. Mus. Par. 4: 337. 1835.

*Meriolix serrulata* Walp. Repert. 2: 79. 1843.

*Meriolix Berlandieri* Walp. Repert. 2: 79. 1843.

*Oenothera spinulosa* var. *Drummondii* Engelm. Pl. Upp. Miss. 192. Acc. to S. Wats.

Saskatchewan to Missouri, Texas and Arizona.

1a. MERIOLIX SERRULATA SPINULOSA (T. & G.).

*Oenothera serrulata* Nutt. Journ. Acad. Phila. 2: 120. 1821.

*Oenothera serrulata* var. *spinulosa* T. & G. Fl. N. A. 1: 502. 1840.

Saskatchewan to Missouri and Texas.

1b. MERIOLIX SERRULATA PINIFOLIA (Engelm.).

*Oenothera serrulata* var. *pinifolia* Engelm. Bost. Jour. Nat. Hist. 5: 189. 1856.

? *Oenothera capillifolia* Scheele, Linnaea, 21: 576. 1848.  
Texas.

13. EULOBUS Nutt.; T. & G. Fl. N. A. 1: 514. 1840.

1. EULOBUS CALIFORNICUS Nutt.; T. & G. Fl. N. A. 1: 515. 1840.

*Eulobus Californicus* Nutt.; T. & G. Fl. N. A. 1: 515. 1840.

*Oenothera Californica* Greene, Pitt. 1: 290. 1889, not S. Wats. 1876.

*Oenothera leptocarpa* Greene, Pitt. 1: 302. 1889.

Southern California.

14. SPHAEROSTIGMA F. & M. Ind. Sem. Hort. Petrop. 2: 49. 1835.

[CHAMISSONIA Link, Jahrb. der Gewächsk. 186. 1818. Not *Chamissoa* H. B. K.]

[AGASSIZIA Spach, Hist. Veg. 4: 346. 1835.]

[HOLOSTIGMA Spach, Nouv. Ann. Mus. Per. 4: 21. 1835.]

Flowers yellow, turning red or green.

Capsules fusiform, straight.

Seeds cylindric-oblong.

1. *S. aldinum*.

Seeds clavate.

2. *S. Hilgardi*.

Capsules linear, somewhat curved.

Plants puberulent or hirsute.

Capsules scarcely beaked.

3. *S. contortum*.

Capsules with a slender beak.

4. *S. campestre*.

Plants viscid-glandular.

5. *S. chamaenerioides*.

Capsules linear or linear-fusiform, more or less contorted.

Flowers less than 1 cm. broad.

Lower stem-leaves linear or nearly so; species

maritime.

6. *S. micranthum*.

Lower stem-leaves ovate; species not maritime.

7. *S. hirtellum*.

Flowers more than 1 cm. broad.

Plant glabrous and lustrous.

8. *S. nitidum*.

Plants pubescent and dull.

Stems woody; leaves sessile.

9. *S. viridescens*.

Stems herbaceous; lower stem-leaves petioled.

Calyx canescent.

10. *S. spirale*.

Calyx hirsute.

Capsule with a very short beak. 11. *S. Bistorta*.

Capsule with a long slender beak. 12. *S. Veitchianum*.

Flowers white or rose-colored; capsules terete or nearly so.

Plants glabrous (inflorescence glabrate); capsules enlarged at the base.

13. *S. decorticans*

Plants pubescent or glandular.

Capsules enlarged at the base, viscid-glandular.

14. *S. Boothii*.

Capsules scarcely enlarged at the base.

Plants more or less villous.

15. *S. Utahense*.

Plants more or less puberulent.

Leaves linear or nearly so.

16. *S. refractum*.

Leaves spatulate, elliptic or lanceolate.

17. *S. alyssoides*.

#### 1. SPHAEROSTIGMA ANDINUM (Nutt.) Walp.

*Oenothera andina* Nutt.; T. & G. Fl. N. A. 1: 512. 1840.

*Sphaerostigma andinum* Walp. Repert. 2: 79. 1843.

Washington to Montana, south to Nevada and Utah; at 1800 meters in Utah and Nevada.

#### 2. SPHAEROSTIGMA HILGARDI (Greene).

*Oenothera Hilgardi* Greene, Bull. Torr. Club, 10: 41. 1883.

Washington and Oregon.

## 3. SPHAEROSTIGMA CONTORTUM (Dougl.) Walp.

*Oenothera contorta* Dougl.; Lehm. in Hook. Fl. Bor. Am. 1: 214. 1833.

*Oenothera strigulosa* T. & G. Fl. N. A. 1: 512. 1840.

*Oenothera parvula* Nutt.; T. & G. Fl. N. A. 1: 511. 1840.

*Sphaerostigma contortum* Walp. Repert. 2: 78. 1843.

*Sphaerostigma parvulum* Walp. Repert. 2: 78. 1843.

*Sphaerostigma strigulosum* F. & M. Ind. Sem. Hort. Petrop. 2: 22. 1835.

Washington to Nevada, Arizona and southern California, where it ascends to 1850 meters.

## 3a. SPHAEROSTIGMA CONTORTUM PUBENS (S. Wats.).

*Oenothera strigulosa* var. *pubens* S. Wats. Proc. Am. Acad. 8: 594. 1873.

*Oenothera contorta pubens* Coville, Cont. Nat. Herb. 4: 104. 1893.

Vancouver Island to Nevada, Arizona and Southern California, ascends to 1500–1700 metres in Nevada and California.

## 3b. SPHAEROSTIGMA CONTORTUM GREENEI.

*Oenothera strigulosa* var. *epilobioides* Greene, Fl. Francis, 216. 1891. Not *OE. epilobioides* Nutt. 1840.

Away from the seaboard, from Oregon to San Diego, Cal.

## 4. SPHAEROSTIGMA CAMPESTRE (Greene).

*Oenothera dentata* S. Wats. Bot. Calif. 1: 226. 1876. Not Cav. Ic. 4: 67. pl. 398. 1797.

*Oenothera campestris* Greene, Fl. Francis, 216. 1891.

From the Valley of the Sacramento to southern California, where it ascends to 1700 meters.

## 4a. SPHAEROSTIGMA CAMPESTRE MINOR.

*Oenothera strigulosa* Benth. Pl. Hartw. 310. 1849.

*Oenothera dentata* var. *cruciata* S. Wats. Proc. Am. Acad. 8: 594. 1873. Not *OE. cruciata* Nutt. 1828.

## 5. SPHAEROSTIGMA CHAMAENERIOIDES (A. Gray).

*Oenothera chamaenerioides* A. Gray, Pl. Wright 2: 58. 1853.  
Southern Utah to Texas and southern California.



## 6. SPHAEROSTIGMA MICRANTHUM (Hornem.) Walp.

*Oenothera micrantha* Hornem. "Hort. Hafn." 1807.*Oenothera dentata* Ser. in DC. Prodr. 3: 46. In part. 1821, not Cav.*Oenothera hirta* Link, Enum. 1: 378. 1821.*Sphaerostigma hirta* F. & M. Ind. Sem. Hort. Petrop. 2: 22. 1835.*Holostigma micrantha* Spach, Nouv. Ann. Mus. Par. 4: 334. 1835.*Sphaerostigma micranthum* Walp. Repert. 2: 77. 1843.*Oenothera asperifolia* Nutt.; S. Wats. Proc. Am. Acad. 8: 680. 1873.*Oenothera cheiranthifolia* Torr. Pacif. R. R. Rep. 4: 87. 1857.*Oenothera strigulosa* Torr. Pacif. R. R. Rep. 4: 87. 1857.*Oenothera bistorta* A. Gray, Proc. Bost. Soc. Nat. Hist. 7: 146. 1859.

From the valley of the Sacramento south to Lower California,

## 7. SPHAEROSTIGMA HIRTELLUM (Greene).

*Oenothera hirtella* Greene, Fl. Francis. 215. 1891.

Mountains, from Lake county, California, southward.

## 8. SPHAEROSTIGMA NITIDUM (Greene).

*Oenothera nitida* Greene, Pitt. 1: 70. 1887.

Vicinity of Monterey Bay, California and on the Island of San Miguel.

## 9. SPHAEROSTIGMA VIRIDESCENS (Lehm.) Walp.

*Oenothera viridescens* Lehm. in Hook. Fl. Bor. Am. 1: 214. 1833.*Sphaerostigma viridescens* Walp. Repert 2: 77. 1843.

Along the coast from Monterey Bay to San Diego.

## 10. SPHAEROSTIGMA SPIRALE (Lehm.) Walp.

*Oenothera spiralis* Lehm. in Hook. Fl. Bor. Am. 1: 213. 1833.

Along or near the coast from San Francisco southward.

## 11. SPHAEROSTIGMA BISTORTA (Nutt.) Walp.

*Oenothera bistorta* Nutt.; T. & G. Fl. N. A. 1: 508. 1840.? *Holostigma Bottae* Spach, Nouv. Ann. Mus. Par. 4: 335. 1835.

*Sphaerostigma bistortum* Walp. Repert. 2: 77. 1843.

*Oenothera cheiranthifolia* A. Gray. Ives, Rep. 12. 18.

Southern California.

12. SPHAEROSTIGMA VEITCHIANUM (Hook).

*Oenothera bistorta* (?) var. *Veitchiana* Hook. Bot. Mag. pl. 5078.

*Oenothera graciliflora* Torr. Pacif. R. R. Rep. 4: 87. 1857.

Southern California to Lower California.

13. SPHAEROSTIGMA DECORTICANS (H. & A.).

*Gaura decorticans* H. & A. Bot. Beech. Voy. 343. 1840.

*Oenothera gauraeiflora* T. & G. Fl. N. A. 1: 510. 1840.

*Sphaerostigma gauraeiflorum* Walp. Repert. 2: 78. 1843.

*Oenothera Nevadensis* Kellogg, Proc. Calif. Acad. 2: 224. pl. 70. 1863.

Southern Utah to Arizona and California; ascends to 2100 meters in California.

14. SPHAEROSTIGMA BOOTHII (Dougl.) Walp.

*Oenothera Boothii* Dougl.; Lehm. in Hook. Fl. Bor. Am. 1: 213. 1833.

*Oenothera pygmaea* Dougl.; Lehm. in Hook. Fl. Bor. Am. 1: 213. 1833.

*Oenothera lithospermoides* Nutt.; S. Wats. Proc. Am. Acad. 8: 604. 1873.

*Sphaerostigma Boothii* Walp. Repert. 2: 77. 1843.

Washington to California and Nevada; occurs at about 1000–1100 meters in Nevada.

15. SPHAEROSTIGMA UTAHENSE n. sp.

Annual, low, pale-green, villous. Stem erect, 2–10 cm. tall, simple or branched at the base or above, the branches ascending; leaves varying from spatulate to ovate, 1–2.5 cm. long, densely villous, obtuse or acutish, entire or obscurely toothed, narrowed into slender petioles; flowers yellow, 8–12 mm. broad, in loose terminal spikes; buds ovoid, 5 mm. long; calyx-tube very slender, 7–9 mm. long, shorter than the ovary, abruptly dilated at the throat; calyx-segments ovate or lanceolate, nearly twice shorter than the tube, involute, acutish; petals obovate, 3–5 mm. long, delicately nerved, crisped at the apex; style slender, exceeding

the stamens; capsules nearly filiform, about 1.5 cm. long, villous, spirally twisted near the base, slightly glandular; seeds oblong, 13 mm. long, pale, very minutely striate.

A species of low habit, related to *S. gauraeiflorum*, *S. Boothii* and *S. refractum*, striking on account of its dense villous pubescence.

Specimens were collected on May 3, 1850, by Capt. Stansbury, at "Great Salt Lake, growing in loose sand on the 'storm line' of the shore," and by M. E. Jones, in June, 1880; these were distributed as *Oenothera Boothii* Dougl.

16. SPHAEROSTIGMA REFRACTUM (S. Wats.).

*Oenothera refracta* S. Wats. Proc. Am. Acad. 17: 373. 1882.  
Southern Utah and northern Arizona.

17. SPHAEROSTIGMA ALYSSOIDES (H. & A.) Walp.

*Oenothera alyssoides* H. & A. Bot. Beech. Voy. 340. 1840.

*Sphaerostigma alyssoides* Walp. Repert. 2: 78. 1843.

Idaho and Oregon, south to Nevada, Utah and southern California; at 1100 meters in Nevada and California.

17a. SPHAEROSTIGMA ALYSSOIDES MINUTIFLORUM (S. Wats.).

*Oenothera alyssoides* var. *minutiflora* S. Wats. Proc. Am. Acad. 8: 591. 1873.

Northern Nevada and Utah.

17b. SPHAEROSTIGMA ALYSSOIDES MACROPHYLLA.

*Oenothera alyssoides* var. *villosa* S. Wats. Proc. Am. Acad. 8: 591. 1873. Not *OE. villosa* Thunb. 1794-1800.

Nevada and Utah.

*Oenothera rutila* Davidson, is said to belong to the genus SPHAEROSTIGMA, but I have not seen specimens.

15. CHYLISMA Nutt.; Raimann in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 217. 1893.

Flowers axillary, subtended by leaves.

1. *C. pterosperma*.

Flowers in terminal racemes, usually subtended by bracts.

Plants caulescent.

Leaves simple.

Leaves cordate; capsules short-pedicelled.

2. *C. cardiophylla*.

Leaves narrowed at the base; capsules long-pedicelled.

- Plants villous; blade of leaf closely toothed. 3. *C. heterochroma*.  
 Plants hirsute; blade of leaf distantly toothed. 4. *C. Parryi*.  
 Leaves compound. 5. *C. multijuga*.  
 Plants scapose.  
 Tips of the calyx-segments not free. 6. *C. scapoidea*.  
 Tips of the calyx-segments free. 7. *C. brevipes*.

I. CHYLISMA PTEROSPERMA (S. Wats.).

*Oenothera pterosperma* S. Wats. Bot. King, Rep. 5: 112. pl.  
 14. 1871.

Northwestern Nevada and Utah; occurs at about 1280 meters  
 in Nevada.

2. CHYLISMA CARDIOPHYLLA (Torr.).

*Oenothera cardiophylla* Torr. Pacif. R. R. Rep. 5: 360. 1856.  
 Southern California to Arizona and Lower California; ascends  
 to 700 meters in California.

3. CHYLISMA HETEROCHROMA (S. Wats.).

*Oenothera heterochroma* S. Wats. Proc. Am. Acad. 17: 373.  
 1882.

Western Nevada.

4. CHYLISMA PARRYI (S. Wats.).

*Oenothera Parryi* S. Wats. Parry, Am. Nat. 9: 20. 1877.  
 Southern Utah and northern Arizona.

5. CHYLISMA MULTIJUGA (S. Wats.).

*Oenothera multijuga* S. Wats. Proc. Am. Acad. 8: 595. 1873.  
 Southern Utah.

6. CHYLISMA SCAPOIDEA (Nutt.).

*Oenothera scapoidea* Nutt.; T. & G. Fl. N. A. 1: 506. 1840.  
 Wyoming and Idaho to Utah and southern California; occurs  
 at about 1280 meters in Utah.

6a. CHYLISMA SCAPOIDEA CRUCIFORMIS (Kellogg).

*Oenothera clavaeformis* T. & G. Pacif. R. R. Rep. 2: 121. 1856.  
*Oenothera cruciformis* Kellogg, Proc. Cal. Acad. 2: 227. 1863.  
*Oenothera scapoidea* var. *clavaeformis* S. Wats. Bot. King's Rep.  
 5: 109. 1871.

*Oenothera scapoidea* var. *purpurascens* S. Wats. Proc. Am.  
 Acad. 8: 595. 1873.

Eastern slope of the Sierra from Oregon to Nevada and southern California; at 400 meters in California.

6b. CHYLISMA SCAPOIDEA CLAVAEFORMIS (Torr.).

*Oenothera clavaeformis* Torr. Frem. Rep. 314. 1845.

*Oenothera scapoidea* var. *aurantiaca* S. Wats. Proc. Am. Acad. 8: 595. 1873.

Southern California and Arizona.

7. CHYLISMA BREVIPES (A. Gray).

*Oenothera brevipes* A. Gray, Pacif. R. R. Rep. 4: 87. 1857.

*Oenothera clavaeformis* Torr. Bot. Mex. Bound. Surv. 66. In part. 1859.

Southern California and Arizona.

## *Salix candida* Willd, and its Hybrids.\*

W. W. ROWLEE AND K. M. WIEGAND.

(PLATE 267.)

Within a radius of twenty miles of Ithaca, New York, there is but a single station for *Salix candida*. This is a swamp, formerly a sphagnous bog, called "Fleming Meadow," two miles south of the city. The swamp is a little higher, possibly fifteen feet, than Cayuga lake. An attempt was made some years ago to drain this and a neighboring bog and thereby to render them suitable for cultivation. The springs of water pouring in thwarted this attempt, and after they had been thoroughly cleared of bushes the attempt to utilize them was abandoned and they were allowed to become wild again.

*Salix candida* persisted along the margins of the ditches during the attempt to drain the bog. These have filled up and the soil has become again very wet. The willow has now spread somewhat from the ditches. Other willows grow in the bog. *Salix cordata* is more abundant than any other. *S. rostrata* and *S. dis-*

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\* We have received from the authors photographs illustrating the variation in buds described in this paper. They are willing to send similar photographs to anyone interested enough to pay the cost of printing and mailing—25 cents each. There are three photographs 5x8 inches, and 6 branches, natural size, represented in each.—ED.